CANCER INCIDENCE IN MASSACHUSETTS

2004 – 2008:

CITY AND TOWN SUPPLEMENT

Bureau of Health Information, Statistics, Research, and Evaluation

Massachusetts Department of Public Health

November 2011

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CONTENTS

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INTRODUCTION

Content

The purpose of this report is to provide an estimate of cancer incidence for each of the 351 cities and towns of Massachusetts for the five-year time period 2004 through 2008. For each city and town, Standardized Incidence Ratios (SIRs) are presented for twenty-three types of cancer and for all cancer types combined. These ratios compare the cancer incidence experience of each city or town with the cancer experience of the state as a whole. The method involves comparing the number of cases that were observed for a city or town to the number of cases that would be expected if the city or town had the same cancer rates as the state as whole. The report is organized into the following sections:

METHODS provides a detailed explanation of the data collection, data processing, and statistical techniques employed in this report.

TABLES present data for selected types of cancer by city/town and sex.

APPENDIX I provides a listing of *International Classification of Diseases for Oncology* codes used in the preparation of this report.

APPENDIX II provides a listing of risk factors for selected cancer types and a listing of the individuals who reviewed the risk factor list.

APPENDIX III describes the Massachusetts Department of Public Health's current cancer control initiatives, and provides links to bureaus within the department that address some aspect of cancer. Links to resources for publications are also provided.

Comparison with Previous Reports

This report updates previous annual reports published by the Massachusetts Cancer Registry (MCR). It is available on line at http://www.mass.gov/dph/mcr. For questions about the report, contact the MCR at:

Massachusetts Cancer Registry
Bureau of Health Information, Statistics, Research, and Evaluation
Massachusetts Department of Public Health
250 Washington Street, 6th floor
Boston, MA 02108-4619
telephone 617-624-5642; fax 617-624-5695

The preceding report, ***Cancer Incidence in Massachusetts 2003-2007: City and Town Supplement,*** included data for diagnosis years 2003 through 2007. This report contains data for the diagnosis years 2004 through 2008. There have been no changes in this report's format from the previous report.

METHODS

Data Collection

Massachusetts cancer incidence data are collected by the Massachusetts Cancer Registry (MCR). The MCR is a population-based cancer registry that was established by state law in 1980 and began collecting data in January 1982. Currently, the MCR collects information on *in situ* and invasive cancers and benign tumors of the brain and associated tissues. The MCR does not collect information on basal and squamous cell carcinomas of the skin.

Facilities reporting to the MCR in 2008 included 68 Massachusetts acute care hospitals, 7 radiation centers, 3 endoscopy centers, 4 surgical centers, 14 independent laboratories, 1 medical practice association, 1 radiation/oncology center, and approximately 500 private practice physicians. Reports from dermatologists' offices and dermatopathology laboratories have only been collected by the MCR since 2001. Reports from urologists' offices have only been collected by the MCR since 2002.

The MCR also collects information from reporting hospitals on cases diagnosed and treated in staff physician offices when this information is available. Not all hospitals report this type of case, however, and some hospitals report such cases as if the patients had been diagnosed and treated by the hospital directly. Collecting this type of data makes the MCR's overall case ascertainment more complete. The cancer types most often reported to the MCR in this manner are prostate cancer and melanoma.

To improve case completeness, this MCR report includes previously unreported cancer cases that have been discovered through death certificate clearance. This process identifies cancers mentioned on death certificates that were not previously reported to the MCR. In some instances, the MCR was able to obtain additional information on these cases through follow-up activities with hospitals, nursing homes and physicians' offices. In other instances, a cancer-related cause of death recorded on a Massachusetts death certificate is the only source of information for a cancer case. These "death certificate only" cancer diagnoses are, therefore, poorly documented, and have not been confirmed by review of complete clinical information. Such cases are included in this report, but they comprise less than 3% of all cancer cases for the years covered by this report.

Each year, the North American Association of Central Cancer Registries (NAACCR) reviews cancer registry data for quality, completeness, and timeliness. For diagnosis years 2004-2008, the MCR's annual case count was estimated by NAACCR to be more than 95% complete each year. The MCR achieved the gold standard for this certification element, in addition to six other quality and timeliness elements for each year during 2004-2008.

Case reports were coded following the International Classification of Diseases for Oncology, Third Edition (ICD-O-3), which was implemented in North America with cases diagnosed as of January 1, 2001 (1). The codes used in this report are listed in Appendix I.

The Massachusetts data summarized in this report were drawn from cancer cases entered on MCR computer files before July 1, 2011 and from death certificate clearance activities completed in November 2010. The numbers presented in this report may change slightly in future reports, reflecting late reported cases or corrections based on subsequent details from the reporting facilities. Such changes might result in slight differences in numbers and rates in future reports of MCR data,

reflecting the nature of population-based cancer registries that receive case reports on an ongoing basis.

Massachusetts cancer cases presented in this report are primary cases of cancer diagnosed among Massachusetts residents during 2004-2008. The Massachusetts data presented include invasive cancers only (except cancer of the urinary bladder, where *in situ* cancers are also included). Invasive cancers have spread beyond the layer of cells where they started and have the potential to spread to other parts of the body. *In situ* cancers are neoplasms diagnosed at the earliest stage, before they have spread, when they are limited to a small number of cells and have not invaded the organ itself. Typically, published incidence rates do not combine invasive and *in situ* cancers due to differences in the biologic significance, survival prognosis and types of treatment of the tumors. Cancer of the urinary bladder is the only exception, due to the specific nature of the diagnostic techniques and treatment patterns.

Presentation of Data

Each city and town in Massachusetts is listed alphabetically in the **TABLES** section. The observed number of cases, the expected number of cases, the standardized incidence ratios, and 95% confidence intervals are presented for twenty-three main types of cancer and for all cancer types combined. The "all cancers combined" category includes the twenty-three main types presented in this report and other malignant neoplasms. This category is meant to provide a summary of the total cancer experience in a community. As different cancers have different causes, this category does not reflect any specific risk factor that may be important for this community.

Observed and Expected Case Counts

The *observed* case count (**Obs**) for a particular type of cancer in a city/town is the actual number of newly diagnosed cases among residents of that city/town for a given time period.

A city/town's *expected* case count (**Exp**) for a certain type of cancer for this time period is a calculated number based on that city/town's population distribution[2] (by sex and among eighteen age groups) for the time period 2004-2008, and the corresponding statewide average annual age-specific incidence rates.

Standardized Incidence Ratios

A Standardized Incidence Ratio (SIR) is an indirect method of adjustment for age and sex that describes in numerical terms how a city/town's cancer experience in a given time period compares with that of the state as a whole.

- An SIR *of exactly 100* indicates that a city/town's incidence of a certain type of cancer is *equal to that expected* based on statewide average age-specific incidence rates.
- An SIR of *more than 100* indicates that a city/town's incidence of a certain type of cancer is *higher than expected* for that type of cancer based on statewide average annual age-specific incidence rates. For example, an SIR of 105 indicates that a city/town's cancer incidence is 5% higher than expected based on statewide average annual age-specific incidence rates.
- An SIR of *less than 100* indicates that a city/town's incidence of a certain type of cancer is *lower than expected* based on statewide average age-specific incidence rates. For example, an SIR of 85 indicates that a city/town's cancer incidence is 15% lower than expected based on statewide average annual age-specific incidence rates.

Statistical Significance and Interpretation of SIRs

The interpretation of the SIR depends on both how large it is and how stable it is. Stability in this context refers to how much the SIR changes when there are small increases or decreases in the observed or expected number of cases. Two SIRs may have the same size but not the same stability. For example, an SIR of 150 may represent 6 observed cases and 4 expected cases, or 600 observed cases and 400 expected cases. Both represent a 50 percent excess of observed cases. However, in the first instance, one or two fewer cases would change the SIR a great deal, whereas in the second instance, even if there were several fewer cases, the SIR would only change minimally. When the observed and expected numbers of cases are relatively small, their ratio is easily affected by one or two cases. Conversely, when the observed and expected numbers of cases are relatively large, the value of the SIR is stable.

A 95 percent confidence interval (CI) has been presented for each SIR in this report (when the observed number of cases is at least 5), to indicate if the observed number of cases is significantly different from the expected number, or if the difference is most likely due to chance. A confidence interval is a range of values around a measurement that indicates the precision of the measurement. In this report, the 95% confidence interval is the range of estimated SIR values that has a 95% probability of including the true SIR for a specific city or town. If the 95% confidence interval range *does not* include the value 100.0, then the number of observed cases is significantly different from the expected number of cases. "Significantly different" means there is at most a 5% chance that the difference between the number of observed and expected cancer cases is due solely to chance alone. If the confidence interval does contain the value 100, there is no significant difference between the observed and expected numbers. Statistically, the width of the interval reflects the size of the population and the number of events; smaller populations and smaller observed numbers of cases yield less precise estimates that have wider confidence intervals. Wide confidence intervals indicate instability, meaning that small changes in the observed or expected number of cases would change the SIR a great deal.

Examples:

- SIR = 137.0; 95% CI (101.6 - 180.6) – the confidence interval does not include 100.0 and the interval is above 100.0, indicating that the number of observed cases is *statistically significantly higher* than the expected number.

- SIR = 71.0; 95% CI (56.2 – 88.4) – the confidence interval does not include 100.0 and the interval is below 100.0, indicating that the number of observed cases is *statistically significantly lower* than the expected number.

- SIR = 108.8 95% CI (71.0-159.4) – the confidence interval DOES include 100.0 indicating that the number of observed cases is *NOT statistically significantly different* from what is expected, and the difference is likely due to chance. When the interval includes 100.0, then the true SIR may be 100.0.

Example of Calculation of an SIR and Its Significance

$$SIR = \frac{\text{OBSERVED CASES}}{\text{EXPECTED CASES}} \text{ X } 100$$

The following example illustrates the method of calculation for a hypothetical town for one type of cancer and one sex for the years 2004-2008:

Age Group	Town X Population	State Age-Specific Incidence Rate	Town X Expected Cases	Town X Observed Cases
	(A)	(B)	(C) = (A) x (B)	(D)
00-04	74,657	0.0001	7.47	11
05-09	134,957	0.0002	26.99	25
10-14	54,463	0.0005	27.23	30
15-19	25,136	0.0015	37.70	40
20-24	17,012	0.0018	30.62	30
UP TO 85+	6,337	0.0010	6.34	8
		Total:	**136.35**	**144**

$$SIR = \frac{\text{Observed Cases}}{\text{Expected Cases}} \text{ X } 100 = \frac{\text{(column D total)}}{\text{(column C total)}} \text{ X } 100 = \frac{144}{136.35} \text{ X } 100 \approx 106$$

Thus the SIR for this type of cancer in Town X is 106, indicating that the incidence of this cancer in Town X is 6% higher than the corresponding statewide average incidence for this cancer. However, the range for the 95% confidence interval (89.1-124.3) (calculation not shown) indicates that the true value may be as low as 89.1 or as high as 124.3 Also, since the range includes the value 100, it means that the observed number of cases is *not statistically significantly higher or lower* than what is expected.

Whenever the number of observed cases is less than five, the corresponding SIR is neither calculated nor tested for statistical significance. This is indicated with an (nc) ("not calculated"). However, the number of observed and expected cases is shown in these circumstances.

Notes about Data Interpretation

The SIR is a useful indication of the disease categories that have relatively high or low rates for a given community. These statistics, however, should be used with care. Such statistics provide a starting point for further research and investigation into a possible health problem, but they do not by themselves confirm or deny the existence of a particular health problem. Many factors unrelated to disease causation may contribute to an elevated SIR, including demographic factors, changes in diagnostic techniques, and changes in data collection or recording methods over time, as well as the natural variation in disease occurrence.

When reviewing the data tables, it is important to keep in mind that an SIR compares the observed cancer incidence in a particular community with the expected incidence based on statewide average annual age-specific incidence rates. This means that *valid comparisons can only be made between a community and the state as a whole*. *SIRs for different cities and towns* ***CANNOT*** and ***SHOULD NOT*** *be compared to each other*. (Comparisons between two communities would be valid only if there were no differences in the age and sex distributions of the two communities' populations.)

Data Limitations

It should be emphasized that apparent increases or decreases in cancer incidence over time might reflect changes in diagnostic methods or case reporting rather than true changes in cancer incidence. Four other limitations must be considered when interpreting cancer incidence data for Massachusetts cities and towns: under-reporting in areas close to neighboring states; under-reporting for cancers that may not be diagnosed in hospitals; cases being assigned to incorrect cities/towns; and standardized incidence ratios based on small numbers of cases.

Border Areas and Neighboring States

Some areas of Massachusetts appear to have low cancer incidence, but this may be the result of under-reporting – that is, a loss of cases diagnosed or treated in neighboring states that are not reported to the MCR. Presently the MCR has reciprocal reporting agreements with fifteen states – Alaska, Arkansas, Connecticut, Florida, Maine, Mississippi, New Hampshire, New York, North Carolina, Rhode Island, South Carolina, Texas, Vermont, Wisconsin, and Wyoming. Approximately one percent of cases are reported by out-of-state hospitals.

Cases Diagnosed in Non-Hospital Settings

During the time period covered by this report (2004-2008), hospitals provided most of the information about cancer cases to the MCR. Dermatologists' offices began reporting in 2001, and urologists' offices in 2002. Some types of cancer in this report are undoubtedly under-reported because they may be diagnosed by private physicians, private laboratories, health maintenance organizations, or radiotherapy centers that escape hospital case identification systems. Examples may include melanoma of the skin, prostate cancer, and certain hematologic malignancies such as leukemia and multiple myeloma. The extent of this under-reporting has not been determined exactly, but the MCR is actively working to increase reporting of cases that are diagnosed by non-hospital sources. The North American Association of Central Cancer Registries has estimated that the MCR's records are more than 95% complete for the period 2004-2008.

City/Town Misassignment

In accordance with standard central cancer registry procedures, each case reported to the MCR ideally should be assigned to the city/town in which the patient lived at the time of diagnosis, based on the address provided by the reporting hospital. In practice, however, a patient may provide the hospital with his/her mailing address (e.g., a post office box located outside the patient's city/town of residence); a business address; a temporary address (e.g., the patient is staying with a relative while receiving treatment and reports the relative's address as his/her own); or a locality or post office name (e.g., "Chestnut Hill" rather than "Boston," "Brookline," or "Newton"). In addition, if a patient has moved since being diagnosed, the hospital may report the patient's current address. Because of the large number of cases reported to the MCR, and because data are reported to the MCR via electronic media, most city/town case assignments are performed by an automated computer process. This simplified matching process may misassign some cases based on the reported locality name. When

MCR staff become aware of such misassignments, they manually correct the errors. Furthermore, in order to minimize such errors, cases from fifty geographic localities prone to city/town misassignment are reviewed manually.

Small Numbers of Cases

Standardized incidence ratios based on small numbers of cases result in estimates that are very unstable. This situation is common when the population of a city or town is small or if the particular cancer type is rare. SIRs and statistical significance are not calculated when the number of observed cases for a specific category is less than five. In these instances, the observed and expected cases are presented in the tables *for qualitative comparison only*.

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A P P E N D I C E S

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APPENDIX I: INTERNATIONAL CLASSIFICATION OF DISEASES FOR ONCOLOGY (THIRD EDITION) CODES USED FOR THIS REPORT [1]

Cancer Site / Type	Primary Site Codes	Histologic Type Codes [2]
Bladder, Urinary	C67.0 - C67.9	all except 9590 - 9989
Brain and Other Nervous System	C70.0 - C72.9	all except 9590 - 9989
Breast	C50.0 - C50.9	all except 9590 - 9989
Cervix Uteri	C53.0 - C53.9	all except 9590 - 9989
Colon / Rectum	C18.0 - C18.9, C19.9, C20.9, C26.0	all except 9590 - 9989
Esophagus	C15.0 - C15.9	all except 9590 - 9989
Hodgkin Lymphoma	C00.0 - C80.9	9650 - 9667
Kidney and Renal Pelvis [3]	C64.9, C65.9	all except 9590 - 9989
Larynx	C32.0 - C32.9	all except 9590 - 9989
Leukemia	C00.0 - C80.9	9733, 9742, 9800 - 9820, 9826, 9831 - 9948, 9963, 9964
	C42.0, C42.1, C42.4	9823, 9827
Liver and Intrahepatic Bile Ducts	C22.0, C22.1	all except 9590 - 9989
Lung and Bronchus	C34.0 - C34.9	all except 9590 - 9989
Melanoma of Skin	C44.0 - C44.9	8720 - 8790
Multiple Myeloma	C00.0 - C80.9	9731, 9732, 9734
Non-Hodgkin Lymphoma	C00.0 - C80.9 all except C42.0, C42.1, C42.4	9590 - 9595, 9670 - 9729 9823, 9827
Oral Cavity and Pharynx	C00.0 - C14.8	all except 9590 - 9989
Ovary	C56.9	all except 9590 - 9989
Pancreas	C25.0 - C25.9	all except 9590 - 9989
Prostate	C61.9	all except 9590 - 9989
Stomach	C16.0 - C16.9	all except 9590 - 9989
Testis	C62.0 - C62.9	all except 9590 - 9989
Thyroid	C73.9	all except 9590 - 9989
Uteri, Corpus and Uterus, NOS	C54.0 - C54.9, C55.9	all except 9590 - 9989
All Sites / Types	C00.0 - C80.9	8000 - 9989

[1] includes codes added to the *International Classification of Diseases for Oncology, Third Edition* since its publication.

[2] Only invasive cancers (those with invasive behaviors) are included in this publication except Bladder, Urinary, which includes invasive and *in situ* behaviors.. Non-invasive (*in situ*) cancers are not included.

[3] Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" site category that is not included in this cancer type.

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APPENDIX II: RISK FACTORS FOR SELECTED CANCER TYPES AND REVIEWERS OF RISK FACTORS

This Appendix contains a list of risk factors for thirteen types of cancer. The list briefly summarizes available information from the scientific literature. The list was last revised in 2000. Cancers are complex diseases, many of which have multiple factors that may contribute to their development. It should be noted that there is no single agreed-upon list of risk factors – even the experts may disagree. This list should be viewed only as a starting point for the interested reader, and should not be viewed as constituting a definitive or comprehensive summary of cancer risk factors. Future risk factor lists may change as new research findings emerge.

The list separates those characteristics for which research clearly indicates a strong association in the development of the cancer ("Risk Factors") from those characteristics for which weaker associations exist ("Possible Risk Factors") or which are now coming under investigation ("Under Investigation").

For additional information on cancer risk factors or prevention, you may wish to contact the following:

Cancer Information Service (National Cancer Institute): 1-800-4-CANCER (1-800-422-6237)

Cancer Response Line (American Cancer Society): 1-800-ACS-2345 (1-800-227-2345)

In addition, the following selected Internet websites provide information on cancer. Many of these also provide links to other sites (not listed) which may be of interest.

Massachusetts Department of Public Health: http://www.mass.gov/dph

American Cancer Society: http://www.cancer.org

Centers for Disease Control and Prevention

Home Page: http://www.cdc.gov

Cancer Prevention and Control Program: http://www.cdc.gov/cancer

Fruits and Veggies More Matters™ Campaign (nutrition – formerly 5-A-Day Program): http://www.FruitsandVeggiesMatter.gov

National Cancer Institute

Information: http://www.cancer.gov

Cancer Literature in PubMed: http://www.cancer.gov/search/cancer_literature

Surveillance, Epidemiology, and End Results (SEER) Program data: http://seer.cancer.gov

Your Cancer Risk (Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine; formerly at Harvard Center for Cancer Prevention): http://www.yourdiseaserisk.wustl.edu

OncoLink (Abramson Cancer Center of the University of Pennsylvania): http://www.oncolink.upenn.edu

Cancerquest (Emory University – Winship Cancer Institute): www.cancerquest.org

Cancer News on the Net® (information on diagnosis and treatment for cancer patients and their families): http://www.cancernews.com

National Coalition for Cancer Survivorship: http://www.canceradvocacy.org

BLADDER, URINARY

Risk Factors:

- Age (In Massachusetts, incidence rates increase markedly in the 65 to 74 year age group, and are highest in the 75 years and older age groups.)
- Cigarette smoking
- Excessive use of certain pain medications such as those containing phenacetin
- Treatment with alkylating agent chemotherapy drugs such as Cytoxan (cyclophosphamide)
- Having had radiation therapy to the bladder

Possible Risk Factors:

- Occupations in which workers are suspected of having an elevated bladder cancer risk due to certain chemical exposures include working in the rubber and/or leather industries, dye manufacturing, painters, professional drivers of trucks and other motor vehicles, aluminum workers, machinists, chemical workers, printers, metal workers, hairdressers, and textile workers
- Urologic conditions such as urinary tract infections and urinary stasis
- Dietary factors

BREAST

Risk Factors:

- Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and are highest in the 75 years and older age groups.)
- Family (mother, sister, or daughter) history of breast cancer, especially if it was detected pre-menopausally (before the change of life)
- High-dose radiation therapy to the chest, especially from age 11 until age 30
- Never giving birth
- First childbirth after age 30
- Menstruating since age 12 or younger
- Late age (older than 55) at menopause (change of life)
- Having inherited a mutation in breast cancer susceptibility genes such as BRCA1 or BRCA2
- Increasing body fat in post-menopausal women
- Estrogen taken post-menopausally (after the change of life)
- More than three alcoholic drinks per day

Possible Risk Factors:

- Diet low in fruits and vegetables

Under Investigation:

- Pesticide exposure
- Other environmental exposures

CERVIX UTERI (cervical cancer)

Risk Factors:

- Age (In Massachusetts, incidence rates are highest in the 45 years and older age groups.)
- Certain types of human papilloma virus (HPV, the virus that causes genital warts)
- Sexual intercourse before age 19
- Multiple sexual partners
- Unprotected intercourse (having sex without a condom)
- Smoking
- Infection with HIV (human immunodeficiency virus, the virus that causes AIDS)

Possible Risk Factors:

- Too little vitamin A, vitamin C, and/or folic acid in the diet
- Exposure to secondhand smoke (other people's smoke)

Use of the medication *diethylstilbestrol (DES)* during pregnancy is associated with later vaginal clear cell adenocarcinoma (a form of cervical and vaginal cancer) in the female children of those pregnancies.

COLON / RECTUM

Risk Factors:

- Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and continue to increase markedly in the 65 to 74 year and 75 to 84 year age groups.)
- A personal history of colorectal polyps or colorectal cancer
- Family history of colorectal cancer or polyps, including the various polyposis syndromes such as familial adenomatous polyposis, Gardner's Syndrome, or Peutz-Jeghers Syndrome
- Personal history of inflammatory bowel disease such as ulcerative colitis or Crohn's Disease
- Personal history of ovarian, breast, or endometrial cancer
- Diet high in red meat, and low in fruits, vegetables, and folic acid
- Physical inactivity

Possible Risk Factors:

- Alcohol, especially beer
- Smoking
- Increasing body fat

LEUKEMIA

Risk Factors:

- Exposure to ionizing radiation
- Exposure to benzene
- Treatment with chemotherapy drugs (especially alkylating agents)
- Certain genetic conditions such as Down's syndrome
- Exposure to ethylene oxide

Possible Risk Factors:

- Exposure to low level solvent and metal mixtures
- Smoking

Under Investigation:

- Exposure to electromagnetic fields (e.g., from power lines)

LUNG AND BRONCHUS

Risk Factors:

- Smoking

  Note: 85% of all lung cancers are caused by smoking. The risk of lung cancer is *10 times greater* for persons who smoke up to one pack of cigarettes a day and *20 times greater* for persons who smoke more than one pack of cigarettes a day than for persons who do not smoke.
- Occupational, and in some cases environmental, exposures (e.g., asbestos, metals)
- Exposure to secondhand smoke (other people's smoke)

MELANOMA OF SKIN

Note: *changing or changed moles*, or *new moles which appear after age 30 that itch and are tender* are early, potentially malignant lesions, and should be examined by a health care professional.

Risk Factors:

- Age (In Massachusetts, incidence rates begin to increase markedly in the 45 to 65 year age group, and are highest in the 75 to 84 year age group.)
- One or more large or unevenly colored lesions such as:
  - Dysplastic (abnormal) mole(s), with or without a family history of melanoma
  - Lentigo maligna (a type of malignant melanoma that is slow growing)
- Familial atypical mole and melanoma syndrome
- Giant congenital melanocytic nevi (pigmented patches of skin)
- Nevus (birthmark) since birth
- Caucasian
- Previous melanoma
- Family history of melanoma
- Immunosuppression (when the body's defenses are weakened, such as after transplant surgery)
- Sun sensitivity
- Repeated sunburns, especially as a child
- Easily sunburned
- Freckling
- Unable to tan easily

NON-HODGKIN'S LYMPHOMA (now known as non-Hodgkin lymphoma)

Risk Factors:

- Age (In Massachusetts, incidence rates begin to increase in the 45 to 65 year age group, and are highest in the 75 to 84 year age group.)
- Abnormalities of the immune system, either congenital or resulting from suppression due to organ transplantation or disease
- Infection with HIV (human immunodeficiency virus, the virus that causes AIDS)
- Exposure to radiation or chemotherapy
- Exposure to certain herbicides

Possible Risk Factors:

- Smoking
- Other chemical exposures

ORAL CAVITY AND PHARYNX

Risk Factors:

- Tobacco use (including cigarettes, pipes, cigars, chewing tobacco, and snuff)
- Heavy alcohol use
- Age (In Massachusetts, incidence rates begin to increase in the 45 to 64 year age group, and are highest in the 75 to 84 year age group.)
- Poor nutrition, especially chronic iron deficiency

Possible Risk Factors:

- Chronic irritation of the mouth due to ill-fitting dentures or broken teeth
- Poor oral hygiene

OVARY

Risk Factors:

- Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and are highest in the 65 to 74 year age group.)
- Never giving birth
- Personal history of endometrial (lining of the uterus), colon, or breast cancer
- Family history of ovarian cancer (mother, sister, or daughter)
- Having one of three inherited ovarian cancer conditions:
  - breast-ovarian cancer syndrome
  - site-specific ovarian cancer syndrome
  - hereditary nonpolyposis colorectal cancer or Lynch II syndrome (includes early-onset colorectal cancer, endometrial cancer, breast cancer, and ovarian cancer)
- Never having used oral contraceptives, or having used oral contraceptives for fewer than five years
- Caucasian

Possible Risk Factors:

- Fertility drugs
- Use of talc powder containing asbestos fibers in the perineal or external genitalia area
- High fat diet

PROSTATE

Risk Factors:

- Age (In Massachusetts, incidence rates begin to increase markedly in the 45 to 64 year age group, and are highest in the 65 to 74 year age group.)
- Family history of prostate cancer
- Hormonal factors
- African-American

Possible Risk Factors:

- Alcohol consumption
- Having a history of benign prostate disease
- Smoking
- Physical inactivity
- Diet high in fat

TESTIS

Risk Factors:

- Age (In Massachusetts, incidence rates are highest in the 20 to 44 year age group.)
- Undescended testicle

Possible Risk Factors:

- Inguinal hernia
- Testicular trauma
- Familial factors
- Occupations related to leather processing

UTERI, CORPUS AND UTERUS, NOS (uterine cancer)

Risk Factors:

- Age (In Massachusetts, incidence rates are highest in the 45 years and older age groups.)
- Personal history of colon and/or breast cancer
- Family history of uterine cancer
- Being more than 20 pounds overweight
- Never giving birth
- Presence of estrogen-producing ovarian tumors
- Postmenopausal (change of life) use of estrogen without progesterone
- Tamoxifen (a drug given to women who have had breast cancer to lower the risk of recurrence)
- Late age (older than 55) at menopause (change of life)

Possible Risk Factors:

- Diet high in fatty foods
- Hypertension (high blood pressure)
- Diabetes (high blood sugar)
- Chronic anovulation (ovaries do not produce eggs)
- Menstrual problems
- Radiation therapy to the pelvis
- Malignant tumors on the ovaries
- Never having used oral contraceptives, or having used oral contraceptives for fewer than five years

Reviewers of Risk Factors

This Appendix was assembled under the auspices of the American Cancer Society (New England Division) through seeking the advice of leading cancer experts. The following clinicians, researchers, and public health professionals reviewed the risk factors for the type(s) of cancers indicated:

Ross Berkowitz, MD (ovarian, uterine)

Cynthia Boddie-Willis, MD, MPH (prostate)

Risa Burns, MD (breast, cervical)

Richard Clapp, ScD (all types)

Graham Colditz, DrPH (colorectal)

Suzanne Condon, MS (all types)

Greg Connolly, DMD (lung)

Daniel Cramer, MD (ovarian)

Letitia Davis, ScD (all types)

Catherine DuBeau, MD (prostate)

Kathleen Egan, PhD (breast)

Richard Fabian, MD (oral)

Marc Garnick, MD (prostate, testicular)

Alan Geller, RN, MPH (melanoma)

Annekathryn Goodman, MD (uterine)

Lauren Holm, RN, MSN (all types)

David Hunter, MD, BS, ScD (all types)

Joe Jacobson, MD (prostate)

Phil Kantoff, MD (bladder, prostate)

Howard Koh, MD, MPH (melanoma)

Robert Krane, MD (testicular)

Frederick Li, MD (all types)

John Lisco, MPH (colorectal)

Robert Mayer, MD (colorectal)

Kenneth Miller, MD (leukemia)

Michael Monopoli, DMD (oral)

Nancy Mueller, ScD
(non-Hodgkin lymphoma)

J. David Naparstek, ScM, CHO (all types)

Robert Osteen, MD (breast)

James Petros, MD (colorectal)

Marianne Prout, MD, MPH (all types)

Lowell Schnipper, MD
(non-Hodgkin lymphoma)

Paul Schroy, MD, MPH (colorectal)

Ellen Sheets, MD (cervical)

William Shipley, MD (bladder)

Art Skarin, MD (lung)

Arthur Sober, MD (melanoma)

Bonnie Tavares, MEd (breast, cervical)

Howard Weinstein, MD (leukemia)

Martha Crosier Wood, MBA (all types)

Risk factors were also reviewed by staff members of the Massachusetts Department of Public Health's Bureau of Environmental Health (all types), Colorectal Cancer Working Group (colorectal), Skin Cancer Prevention Program (melanoma), and Massachusetts Women's Health Network (breast, cervical).

We would also particularly like to thank Lauren Holm, former Vice President for Planning and Evaluation, American Cancer Society (New England Division), and Martha Crosier Wood, former Director, Comprehensive Cancer Prevention and Control, Massachusetts Department of Public Health, for their assistance in the development of this Appendix.

APPENDIX III: MDPH CANCER PREVENTION AND CONTROL INITIATIVES

The Massachusetts Department of Public Health is working to reduce the incidence and mortality of cancer in the Commonwealth. Partnerships between MDPH programs, researchers, healthcare providers and nonprofit organizations collect information about cancer, lead quality improvement projects, coordinate evidenced-based workshops for managing living with chronic disease (including cancer), provide education for health professionals and bring shared messages to the public. Our collaborated efforts focus on reducing cancer risk, incidence and mortality through healthy lifestyles, early diagnosis, and increased access to care. The Department's programs address the impact of tobacco, alcohol, nutrition, and physical activity on cancer prevention, along with environmental and occupational hazards for cancer. Throughout all of our efforts there is an emphasis on reducing disparate health outcomes and unequal access to cancer care.

MDPH Bureaus and Programs:
Bureau of Environmental Health, www.mass.gov/dph/environmental_health
Bureau of Substance Abuse Services, www.mass.gov/dph/bsas
Comprehensive Cancer Prevention and Control Program, www.mass.gov/dph/cancer
Men's Health/Women's Health/Care Coordination Program
Tobacco Cessation and Prevention Program, www.mass.gov/dph/mtcp
Occupational Health Surveillance Program, www.mass.gov/dph/ohsp
Office of Healthy Aging, www.mass.gov/dph/healthyaging
Oral Health Program, www.mass.gov/dph/oralhealth
Wellness Unit,
http://www.mass.gov/?pageID=eohhs2terminal&L=5&L0=Home&L1=Government&L2=Departments+and+Divisions&L3=Department+of+Public+Health&L4=Programs+and+Services+T+-+Z&sid=Eeohhs2&b=terminalcontent&f=dph_com_health_g_div_wellness&csid=Eeohhs2

MDPH publications on cancer prevention and screening are available at the Massachusetts Health Promotion Clearinghouse, www.maclearinghouse.com.

Massachusetts Cancer Registry Publications are available through the Massachusetts Cancer Registry, telephone: 617-624-5642 and on the web at www.mss.gov/dph/mcr.

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2. Massachusetts Department of Public Health, Bureau of Health Statistics, Research and Evaluation, Division of Research and Epidemiology. James K. West, PhD, Demographer. January 2002. Preliminary Draft Allocation and Interpolation of Census 2000 SF1 File and Massachusetts Institute for Social and Economic Research 1998 Population Estimate File.

   Demographic/Census Files, Population 2000: Census Counts & Sample Socio-Demographic Data, Population File: Selected Race Categories, Age Sex
   Massachusetts Community Health Information Profile (MassCHIP)
   Massachusetts Department of Public Health
   Data for 2004 from v 3.0 r 313
   Data for 2005 from v 3.0 r 319

   Massachusetts (Department of Public Health) Modified Age, Race/Ethnicity, & Sex Estimates 2005 (MMARS05), released October, 2006.

   Demographic/Census Files, Population 1985-2005: Census Counts & Estimates by Sex, Age (5-Yr Age Groups) & Race
   Massachusetts Community Health Information Profile (MassCHIP)
   Massachusetts Department of Public Health
   Data for2006-2008 from v 3.0 r 319